refuge at great expense, in instituting a series of astronomical observations, and issuing an elaborate series of charts for the protection of mariners against the unavoidable risks and dangers of a seafaring life. The extent to which pure Science should be assisted by the State is still one of the grave questions for discussion of the day. But when we come to purely domestic, and especially to agricultural matters, few people seem to think that the State has any rightful authority here. Except the mariner, the farmer's welfare is more dependent on his knowledge of natural phenomena than that of any other class of the community. Who can calculate the enormously increased material gain to the country, were we able, from any series of meteorological observations, to predict with moderate certainty the weather for a week? Since the first dawn of agriculture, crops have been ravaged by insect enemies: "the palmer-worm, the canker-worm, and the caterpillar," have been the farmer's foes for the past three thousand years; and at the present day very little more is known of the causes of, or the remedies for, these plagues than in the days of Israel in Egypt. Our apples, our turnips, our hops, our vines, our potatoes, to say nothing of our gooseberries and our roses, are subject every few years to all but absolute destruction, and we are content to sit by idle, and to trust that next year will be a good year because this year has been a bad year. The continued existence among the farmers of some parts of England, of sparrow clubs, notwithstanding what has been written about the benefit conferred on the crops by these birds, is a standing evidence of the dense impenetrable ignorance in which the mass of our population is steeped.

In other countries they manage matters differently. Few can doubt that a laborious series of investigations as to the causes of and the best means of preventing the potato blight or the turnip-fly, aided by the light of the most recent discoveries in biology, such as M. Pasteur has conducted in the case of the silkworm disease in France, would be productive of most important results. We have before us the "Third Annual Report on the noxious, beneficial, and other Insects of the State of Missouri, made to the State Board of Agriculture, pursuant to an appropriation for this purpose from the Legislature of the State, by Charles V. Riley, State Entomologist." The report contains descriptions, with woodcuts, of the most pestilent insects of the State, of their mode of propagation, and of the result of experiments in different methods for their destruction; and others of the American States have annually granted sums of money for similar purposes, money which we cannot doubt has fructified hundredfold for the benefit of the thrifty western farmers. The Central Government of the United States publishes "Monthly Reports of the Department of Agriculture," containing an immense mass of information as to the progress of agriculture at home and abroad, the rearing of cattle, market prices, meteorological observations for the month, scientific notes, and innumerable subjects of interest and practical value to the farmer. Is it not worth consideration whether we might not spend a little of the public money that is now wasted in perfectly useless non-scientific experiments, to forward practical researches which have for their chief object the benefit of large classes of our fellow subjects, and the increase of the prosperity of the country at large?

MACNAMARA ON CHOLERA

A Treatise on Asiatic Cholera. By C. Macnamara, Surgeon to the Calcutta Ophthalmic Hospital. Pp. 557. (London: Churchill, 1870.)

THE literature of Cholera progresses with far greater strides than the scientific knowledge of Cholera. Here we have another large book devoted to the history of one disease, containing a digest of past information regarding the history, theories, and treatment of Cholera, and leaving us at the end with another theory of the disease, which is supposed to include the main practical facts in a useful form.

Discussions on professional matters are beyond our sphere, but as the subject of Mr. Macnamara's book is one of great public interest, especially at the present time, it may not be out of place to glance at it very briefly, from the scientific aspect of some of the questions dealt with by the author. The historical part of the work consists of statements and opinions of different writers of the most opposite kind. It is scarcely too much to say that these describe Cholera to be unquestionably contagious and as unquestionably non-contagious; that it is importable by ships and not importable; that its progress can be arrested by quarantine and that quarantine is a useless precaution; that it is communicable by clothing and that it is not so communicable; that it does and does not attack people living under the same unhealthy conditions; and that it can be cured by certain methods of treatment and that it can't be so cured. And then to crown the whole, we have theories of the disease which are as contradictory to each other as the facts. It appears to us that when we are confronted with evidence such as this, we can only arrive at one of two conclusions, either that the observations were one-sided and the logic wofully defective, or that there were reasons for the apparent contradictions requiring careful scientific study. Mr. Macnamara's own views about Cholera may be briefly summarised as follows:—

1. That the cause of Asiatic Cholera "is invariably a portion of the fomes of a person suffering from the disease." 2. That this must be in what is called the "vibrionic stage" of decomposition. 3. That it must be swallowed. 4. That it causes changes in the intestinal epithelium similar to its own, and that the epithelium is as it were washed off by the efflux of serous matter and passes away in the discharges. 5. That the organic cause of Cholera may be preserved dry for years. 6. That water is the most common medium of its diffusion, but that it may be carried and may act in foul air; and, lastly, the author says, "with the exception of the specific Cholera-infecting matter, I entirely ignore all other causes or combination of causes as capable of producing this disease." This last position, which is left unproved, is, indeed, the foundation of the theory. The theory is much the same as that put forward by Dr. Snow, Dr. Budd, Dr. Farr, and others, with a theoretical addition from another quarter as to the manner in which the poison acts.

The first remark which we would make is, that if there exists a Cholera germ, matter, *Cholerine*, or whatever else it may be called, its existence can be proved.

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But the supposed pathological action of the matter, if it exists, may be considered as disposed of by Dr. Lewis's Report on the Scientific Inquiry into Cholera in India, in which he tells us "that the flakes and corpuscles in rice-water stools do not consist of epithelium or its *débris*." There being no *corpus delictum*, "Cholera infecting matter" cannot act in the way supposed. The whole structure falls to pieces whenever the light of scientific observation is brought to bear on it. We are thus left to deal with the other half of the theory, namely, the "Cholera germ," which is supposed by some to be of fungoid nature. But when we look for proof of its existence, we find only inference. The "fungoid" bodies which, by another modification of this theory, were supposed to be the agents in removing the epithelium, have been shown by Dr. Lewis to differ in nothing from similar bodies in healthy discharges, so that this fungoid theory has stood the test of observation no more than the "vibrionic" theory.

Instead of supplying the place of fact by inference or theory, would it not be better once for all to discard both, and try another method of arriving at truth regarding epidemic diseases? We agree with Prof. Tyndall as to the importance of physical research in such questions. Its methods are precise and rigorous, and by taking no cognizance of what is unproved, it may eventually do much in reconciling all the diversities of medical observation, and in opening out entirely new fields of investigation. Under the Government of India a most important scientific inquiry into Cholera is now being carried on in that country; and to all appearance the time is at hand when the most competent scientific men in Europe will have opportunities enough of dealing with the subject. Let the inquiry be strictly scientific. Let us refuse absolutely to admit anything of which we have not scientific proof, and we shall at least be able to divide between the known and the unknown.

Notwithstanding these criticisms on scientific points, Mr. Macnamara has written an interesting book which will well repay perusal. Amongst other things, he gives an account of the various practical sanitary proceedings which have been in use for mitigating attacks of Cholera.

Setting aside all theories about their action, it is satisfactory to know that with temperance in diet, attention to clothing, pure water for drinking and cooking purposes, and rigid cleanliness of towns, houses, and persons, as well as in ships, there is little to fear from Cholera epidemics. There is no theory needed to help us to understand these things. They simply require to be done. Volumes of instruction will not make the duty of doing them plainer than it is. These are, moreover, the things which are especially required for India, and we heartily second Mr. Macnamara's appeal to Lord Mayo, and to our present scientific Minister for India with which he concludes his work:—"The question for the consideration of the Government, is nothing less than this: Shall Cholera be allowed by our mismanagement or neglect to become permanently localised throughout the civilised world. It is to the condition of the inhabitants of the Gangetic valley that our attention and efforts must be primarily directed, if Asiatic Cholera is ever to be effectually controlled by human agency."

OUR BOOK SHELF

Papers on the Great Pyramid. By St. John Vincent Day, C.E., F.R.S.E., &c. (Edinburgh: Edmonston and Douglas, 1870.)

The Great Pyramid of Jizeh: the Plan and Object of its Construction. (Cincinnati: R. Clarke and Co., 1871.)

THE investigation of the history and origin of the Pyramids, and the attempt to arrive at the truths that are hidden in these, the greatest monuments of antiquity, is undoubtedly of the first importance, but must nevertheless be entered upon with caution. There is a danger about such a study which few seem to escape, a danger of being enslaved by some theory which becomes absolute master of the man who originated it, which makes him see everything through a false medium, and in support of which he perverts facts in the most marvellous manner. Mr. Day, the author of the "Papers on the Great Pyramid," has avoided the danger to this extent, that he brings forward no new theory of his own, but places his entire faith in Prof. Piazzi Smyth, the Astronomer Royal for Scotland, to whom this volume is dedicated. The papers are three in number; the first is a critical examination of Sir Henry James's "Notes on the Great Pyramid of Egypt," and would not have been written, the author tells us, had not Sir Henry himself opened and continued a correspondence with him on the subject, and had not he felt "the promptings of duty to expose fallacies so authoritatively flung into the midst of mankind." The two other papers are entitled, "The Measurements of the Great Pyramid recorded in history," and "An examination into the condition and works of mankind from the Creation to the building of the Great Pyramid." More than half of the entire volume is occupied by the first paper, and in it Mr. Day examines in the most minute manner every one of the eight "notes" he undertakes to controvert. He has succeeded in showing that Sir Henry James has been, to say the least, careless in his assertions, and even in his arithmetic, considering how positive his statements were. The general impression left upon the mind of the reader is that until the measurements of the pyramid have been ascertained without a shadow of doubt, no man has a right to base upon them positive assertions as to standards of length. Notwithstanding defects in his mode of treatment of the subject which it is hardly within our province to criticise, the book recommends itself to those who are interested in the Great Pyramid controversy, as it is evidently the result of careful study.

We also wish to notice in this place a small pamphlet on the Pyramid of Jizeh, which has come to us from across the Atlantic. The author does not profess intimate acquaintance with his subject, but acknowledging that such suggestions must be made with much reserve, points out certain relations he has discovered between the measurements of the pyramids and "time, extension, and earth space." They are certainly ingenious, but hardly, we think, much more. As illustrating what was said about the danger of indulging in such speculations, the author concludes by abruptly exclaiming that the fact of the English inch and English foot running "in such admirable rhythm with time and pyramid measure," may be a link of connection between the Anglo-Saxon and Hebrew races. Then plunging still deeper into this dangerous line of thought, he says, "were the blind eyes opened, it is quite possible that here in this new world of ours one would suddenly come to the realisation that he was dwelling in the midst of the teeming multitudes of Israel; terminating their emigration in a land long promised, long reserved; under government of a commonwealth restored; free from every taint of caste condition, or of kingly rule."

Although this pamphlet seems distinguished more by ingenuity than by any real value, it possesses the merit of being short, and is written with a reserve proper when dealing with such a subject.

R. B. D.

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